INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2004/013014

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] C07D257/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] C07D257/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
CA(STN), REGISTRY(STN)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 05-271205 A (Synthelabo), 19 October, 1993 (19.10.93), Particularly, page 5, left column, line 49 to page 6, left column, line 3; page 8, right column, lines 23 to 33 & EP 0550313 A1 & US 5371233 A	10-12 1-9
Y	JP 09-309883 A (Toyo Kasei Kogyo Co., Ltd.), 02 December, 1997 (02.12.97), Particularly, page 13, left column, line 20 to right column, line 23 & EP 0796852 A1 & US 5744612A	1-9

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
15 November, 2004 (15.11.04)	07 December, 2004 (07.12.04)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

Form PCT/ISA/210 (second sheet) (January 2004)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2004/013014

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	Edited by CSJ: The Chemical Society of Japan, Shin Jikken Kagaku Koza (Vol.14), "Yuki Kago butsu no Gosei to Hanno [II]", Maruzen, 20 December, 1997 (20.12.97), pages 639 to 643, 679 to 680	4-5
Y	Supervised by Nanio KOTAKE, Dai Yuki Kagaku (Vol.9), "Hokozoku Kagobutsu I", 6th edition, Asakura Shoten, 30 September, 1967 (30.09.67), pages 275 to 276	4-5
Y	JP 2001-518904 A (Istituto Luso Farmaco D'Italia S.p.A.), 16 October, 2001 (16.10.01), Particularly, Claims & WO 1998/046562 A1 & EP 0973729 A1 & US 6111114 A	4-5
Y	JP 2001-512090 A (BASF AG.), 21 August, 2001 (21.08.01), Particularly, Claims & WO 1999/006339 A1 & EP 0999999 A1 & US 6133468 A	4-5
Y	JP 02-221233 A (Sanko Kagaku Kabushiki Kaisha), 04 September, 1990 (04.09.90), Particularly, Claims (Family: none)	4-5

PATENT COOPERATION TREATY

PCT/JP2004/013014

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF TRANSMITTAL
OF COPIES OF TRANSLATION
OF THE INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY
(CHAPTER I OR CHAPTER II
OF THE PATENT COOPERATION TREATY)
(PCT Rules 44*bis*.3(c) and 72.2)

To:

ENOMOTO, Masayuki
c/o Sumitomo Chemical Intellectual Property Service, Limited,
5-33, Kitahama 4-chome, Chuo-ku
Osaka-shi, Osaka 5418550
JAPON

Date of mailing *(day/month/year)*	
06 July 2006 (06.07.2006)	
Applicant's or agent's file reference S10867WO01	**IMPORTANT NOTIFICATION**
International application No. PCT/JP2004/013014	International filing date *(day/month/year)* 01 September 2004 (01.09.2004)
Applicant SUMITOMO CHEMICAL COMPANY, LIMITED et al	

1. **Transmittal of the translation to the applicant.**

☑ The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).

☐ The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

2. **Transmittal of the copy of the translation to the designated or elected Offices.**

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

None

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EA, EC, EE, EG, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

3. **Reminder regarding translation into (one of) the official language(s) of the elected Office(s).**

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Yoshiko Kuwahara
Facsimile No. +41 22 338 82 70	Facsimile No. +41 22 338 82 70

Form PCT/IB/338 (January 2004)

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44*bis*)

Applicant's or agent's file reference S10867WO01	**FOR FURTHER ACTION**	See item 4 below
International application No. PCT/JP2004/013014	International filing date *(day/month/year)* 01 September 2004 (01.09.2004)	Priority date *(day/month/year)* 04 September 2003 (04.09.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant SUMITOMO CHEMICAL COMPANY, LIMITED		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 *bis*.1(a).

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☐	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44*bis*.3(c) and 93*bis*.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44*bis* .2).

	Date of issuance of this report 26 June 2006 (26.06.2006)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Yoshiko Kuwahara
Facsimile No. +41 22 338 82 70	e-mail: pt07@wipo.int

Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

TRANSLATION

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

	Date of mailing *(day/month/year)*
Applicant's or agent's file reference S10867WO01	FOR FURTHER ACTION See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/JP2004/013014	01.09.2004	04.09.2003

International Patent Classification (IPC) or both national classification and IPC

Applicant
SUMITOMO CHEMICAL COMPANY, LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP	Authorized officer
Facsimile No.	Telephone No.

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/013014

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material

☐ in written format

☐ in computer readable form

c. time of filing/furnishing

☐ contained in the international application as filed.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/JP2004/013014

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-12	YES
	Claims		NO
Inventive step (IS)	Claims		YES
	Claims	1-12	NO
Industrial applicability (IA)	Claims	1-12	YES
	Claims		NO

2. Citations and explanations:

Document 1: JP 05-271205 A (Synthelabo), 19 October 1993
Document 2: JP 09-309883 A (Toyo Kasei Kogyo Co., Ltd.), 02 December 1997
Document 3: Nihon Kagakukai Ed., Shin Jikken-kagaku Koza (Vol. 14), Yuki kagobutsu no gosei to hanno [II], Maruzen, 20 December 1997, pp. 639-643, 679-680
Document 4: KOTAKE, Munio, Dai-Yukikagaku (Vol. 9), Kobozoku kagobutsu I, 6th Ed., Asakura Shoten, 30 September 1967, pp. 275-276
Document 5: JP 2001-518904 A (Istituto Lusofarmaco d'Italia SpA), 16 October 2001
Document 6: JP 2001-512090 A (BASF Aktiengesellschaft), 21 August 2001
Document 7: JP 02-221233 A (Sanko Kagaku Kogyo KK), 04 September 1990

(Claims 1-3 and 6-9)

The inventions of claims 1-3 and 6-9 do not appear to involve an inventive step over documents 1 and 2 cited in the ISR.

Document 2 describes a method for manufacturing 5-substituted tetrazoles wherein nitriles are reacted with an inorganic azide salt in the presence of an amine salt in an aromatic hydrocarbon solvent. Moreover, document 2 describes that 4'-methylbiphenyl-2-carbonitrile, which has an extremely similar structure to 2'-cyanobiphenyl-4-carbaldehyde, can be converted to the corresponding tetrazole with high yield (example 31).

Thus, it would be easy for a person skilled in the art to achieve the inventions described in claims 1-3 and 6 by reacting 2'-cyanobiphenyl-4-carbaldehyde with an azide salt by the method described in document 2 in order to manufacture the publicly known 2'-(1H-tetrazole-5-yl)biphenyl-4-carbaldehyde described in document 1.

Moreover, when the target compound is a crystalline compound, obtaining crystals after the reaction and improving the purity of the crystals by recrystallizing them with a solvent such as tetrahydrofuran are known technologies, so it would be easy for a person skilled in the art to conceive of applying these operations to 2'-(1H-tetrazole-5-yl)biphenyl-4-carbaldehyde to achieve the inventions described in claims 7-9.

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of: Box V

(Claims 4-5)

The inventions of claims 4-5 do not appear to involve an inventive step over documents 1-7 cited in the ISR.

As described in documents 3-7, brominating an aromatic methyl compound and then oxidizing or hydrolyzing it to obtain an aromatic aldehyde compound is a known technology, and it would be easy for a person skilled in the art to conceive of using this method in manufacturing 2'-cyanobiphenyl-4-carbaldehyde from 2'-cyano-4-methylbiphenyl, thereby achieving the invention described in claim 4.

Moreover, bromination using bromine in the presence of a radical initiator and an oxidizer is a known technology as described in documents 5-7, and it would be easy for a person skilled in the art to conceive of adopting this method for purposes of bromination, thereby achieving the invention described in claim 5.

(Claims 10-12)

The inventions of claims 10-12 do not appear to involve an inventive step over document 1 cited in the ISR.

Document 1 describes that 2'-(1H-tetrazole-5-yl)biphenyl-4-carbaldehyde is a crystalline compound.

In addition, recrystallization from a suitable solvent is a common technique for improving the purity of a crystalline compound containing impurities, and it would be easy for a person skilled in the art to adopt these operations for improving the purity of 2'-(1H-tetrazole-5-yl)biphenyl-4-carbaldehyde, thereby achieving the inventions described in Claims 10-11.

It would also be easy for a person skilled in the art to conceive of subjecting the 2'-(1H-tetrazole-5-yl)biphenyl-4-carbaldehyde with the purity improved by recrystallization to XRD analysis to confirm its principal peaks, thereby achieving the invention described in claim 12.